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AUTHOR Petrosko, Joseph M.
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ABSTRACT

A factor analysis was performed of education goal ratings of principals, teachers and parents of a number of California elementary schools. One hundred and six goals obtained from the Center for the Study of Evaluation's Needs Assessment Kit were rated on a five point scale for their importance. Ratings were submitted to a principal components factor analysis and then varimax rotation. Obtained factors included one for "traditional education," affective goals, and foreign language education. (Author)

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A FACTOR ANALYSIS OF EDUCATIONAL GOAL RATINGS FROM THE CSE NEEDS ASSESSMENT KIT*

Joseph M. Petrosko

Center for the Study of Evaluation
University of California, Los Angeles

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INTRODUCTION

The five-stage model of evaluation developed by the Center for the Study of Evaluation (CSE) addresses itself to the decision needs of educators (Alkin, 1967, 1969; Klein, Fenstermacher, & Alkin, 1971). Educational evaluation is defined as "the process of determining the kinds of decisions that have to be made; selecting, collecting, and analyzing information needed in making these decisions; and then reporting this information to appropriate decision makers (Klein, Fenstermacher, & Alkin, p. 9)."

The CSE model is a five-stage conceptual elaboration of the above definition. Each stage is summarized below:

Needs assessment involves stating potential educational goals or objectives deciding which of these are of highest priority, and determining how well the existing educational program is meeting these objectives. The latter information is used to identify the major needs. A typical question to be addressed by a needs assessment decision is: "What part of the school curriculum is most in need of revision?"

Program planning involves making decisions about the kinds of programs or program components that should be adopted to solve the problems identified in needs assessment. After a series of planning meetings, a written document is produced that describes how desired objectives are to be met. A typical question to be addressed by program planning is: "What instructional strategy should be adopted in the new program?"

Implementation evaluation focuses on whether the procedures specified in the program plan are carried out. An exemplary implementation evaluation question is: "Are the instructional processes specified in the plan actually going on after the program starts?"

Progress evaluation is aimed at determining the extent to which the program is making gains towards its objectives. A typical question addressed by this type of evaluation decision is: "How many students are achieving the intended objectives at the half-way point of the program?"

Outcome evaluation is directed at the final judgments regarding the worth of a total program. A typical question addressed by an outcome evaluation decision is: "Should we continue the program next year?"

Four evaluation KIT's are being developed by CSE to guide elementary school personnel in performing the full range of major evaluation activities. The first of these, The CSE Elementary School Evaluation KIT: Needs Assessment (Hoepfner, Bradley, Klein, & Alkin, 1972) leads to identification of high priority educational goals. The second of the series, The CSE Elementary School Evaluation KIT: Program Planning leads to the selection of a methodology to achieve previously identified high priority goals. The third KIT, The CSE Elementary School Evaluation KIT: Formative Evaluation concentrates on monitoring the implementation and progress of the program.[1] Outcome or summative evaluation will be the focus of the fourth CSE evaluation KIT.

The CSE Elementary School Evaluation KIT: Needs Assessment guides the user in selecting, collecting and analyzing information for needs-assessment decision making. Emphasis is given to choosing valid and reliable standardized tests to measure current student achievement. Another feature is the collective viewpoints

[1] Field-testing of the CSE KIT on Program Planning and Formative Evaluation will be completed in 1974.

procedure of goal selection in which significant individuals in the school (parents, faculty and the principal) rate educational goals for their importance on a five-interval scale.

The 106 goals in the Needs Assessment KIT set the stage of the entire evaluation; they form the comprehensive set of goals used in the rating procedures and standardized tests administered to students are keyed to them. The CSE elementary goals refer to student outcomes in the academic, affective, and psychomotor domains. Each goal consists of a title followed by a short descriptive paragraph. The level of generality is a compromise between the extreme specificity of a behavioral objective and the broadness of some all-encompassing statement. Some examples of the CSE elementary goals follow:

3B. Self Esteem

Has a healthy self-concept, self-confidence, self-security, and self-esteem.

17A. Mathematical Problem Solving

Uses mathematical knowledge and skills (arithmetic, measurement and geometry) to solve common practical problems.

24B. Physical Development and Well-Being (Physical Education)

Has a healthy body and physical well-being. Meets physical emergencies. Demonstrates good physical condition. Has efficient body movements.

29B. Silent Reading Efficiency

Reads at a reasonable rate for age and grade level. Adjusts reading speed to material and purpose. Reads rapidly.

The CSE Needs Assessment KIT was nationally field tested prior to its release for commercial publication. While the major purpose of the field test was to gather information on the clarity and usability of the material, a side benefit was the acquisition of hundreds of ratings of the 106 goals. A recent

monograph (Hoepfner, Bradley, & Doherty, 1973) provides a detailed report of the field test results. Summaries are given of average goal ratings by parents, teachers, and principals. The authors also discuss the influence of ethnicity, population density, and geographic region on the ratings and they speculate on the policy implications of the results.

The goal rating procedure yields many ratings for each respondent. It is difficult to get a grasp on systematic patterns in the data. Therefore, it was thought reasonable to apply some simplifying statistical approach to reduce the complexity of a large multi-variate system. The present study is a factor-analysis of goal ratings from a sample of California schools that participated in the CSE Needs Assessment KIT field test in 1970-1971.

METHOD

Subjects

The subjects in this study were 46 elementary school principals, 39 parent groups and 42 teacher groups from California elementary schools.[2] All participated in the study during the 1970-71 school year. The schools from which subjects were drawn do not constitute a random sample of California schools. Nevertheless, they well represented the state with respect to socioeconomic status, population density, and ethnicity.

Ratings Used in the Analysis

The factor analysis was performed on 127 sets of ratings of the 106 goals. These sets do not reflect 127 occasions in which the goals were rated. Each

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[2]My thanks to Paul Bradley for alerting me to the existence of the data used in this study and to Ralph Hoepfner for several helpful comments.

principal rated the goals on two occasions (separated by one week) and the average used as the set which was analyzed. The 39 sets from parents reflect the average ratings from 39 groups (every group having at least 10 parents). Similarly, the 42 sets from teacher groups reflect the average ratings from at least 10 teachers in 42 groups. In total, a minimum of 856 persons contributed ratings (46 principals, 390 parents, 420 teachers).

Procedure

For each occasion of goal rating the same procedure was followed. The rater was provided with a randomly shuffled deck of 106 cards, each containing a description of an educational goal. On a table were placed five envelopes with the following labels:

1. Unimportant, Irrelevant
2. Marginal Importance
3. Average Importance
4. Moderate Importance
5. Most Important

Each rater was instructed to look through the deck and read the goals in order to get a "feel" for them. They were then required to sort the goal cards into five piles corresponding to the goals' importance. Raters were required to put at least five cards in each pile. General instructions stressed that goals be judged solely in terms of their importance--solely in terms of how important it is that a student possess the skill, knowledge, attitude or interest.

RESULTS

The sets of ratings were submitted to principal axes factor analysis followed by varimax rotation of the factors. Squared multiple correlations

were used as initial communality estimates. Tables 1 through 7 display factor loading, original and rotated, of the first 7 factors obtained. These factors accounted for 51% of the variance in the ratings. Only goals with loadings (after rotation) of ±.40 are listed. The heading of each table contains the name assigned to the factor by the author.

Table 1 shows the first factor, termed Traditional Education. The goals loading highest on this factor were close to the proverbial "3 R's" of education. Language Arts, Arithmetic, and Reading predominate as do three cognitive goals in the area of memory. Two geography goals also loaded high on this factor.

Insert Table 1 about here

As can be seen in Table 2, the second factor represented the domain of Affective Education. Goals with the highest loadings were related to the emotional development of the student. In addition to the typical "affective sounding" goals such as Self-Esteem and Neuroticism-Adjustment, goals relating to physical education and citizenship also loaded high on the factor. This is understandable since the latter areas represent borderline regions of the curriculum. Such goals have some academic content and some elements of student personality expression. For example, Sportsmanship requires some knowledge of rules, strategies, and the proper style to be followed in a game or sport. But Sportsmanship also has some elements of an enduring personality trait that stays with the child throughout the day.

Insert Table 2 about here

TABLE 1

TRADITIONAL EDUCATION FACTOR:
ORIGINAL AND ROTATED FACTOR LOADINGS

	Goal	Factor Loadings Original	Rotated
10A	Span and Serial Memory	.54	
10B	Meaningful Memory	.52	
10C	Spatial Memory	.49	
13A	Spelling	.39	.7[illegible]
13B	Punctuation	.49	.74
13C	Capitalization	.58	.74
13D	Grammar and Usage	.43	.68
13E	Penmanship	.36	.54
13G	Independent Application of Writing Skills	.70	.50
14A	Use of Data Sources as Reference Skills	.51	.59
14B	Summarizing Information for Reference	.61	.62
15A	Comprehension of Numbers and Sets in Math	.50	.54
15B	Comprehension of Positional Notation in Math	.61	.69
15C	Comprehension of Equations and Inequalities	.58	.53
15D	Comprehension of Number Principles	.54	.45
16A	Operations with Integers	.39	.66
16B	Operations with Fractions	.53	.75
16C	Operations with Decimals and Percents	.47	.69
18B	Geometric Vocabulary	.58	.46
28A	Phonetic Recognition	.25	.69
28B	Structural Recognition	.37	.56
29A	Oral Reading	.12	.49
29B	Silent Reading Efficiency	.54	.[illegible]
30A	Recognition of Word Meanings	.58	.55
30B	Understanding Ideational Complexes	.49	.42
30C	Remembering Information Read	.53	.70
31A	Inference Making from Reading Selections	.61	.40
32C	Familiarity with Standard Children's Literature	.55	.40
39A	Knowledge of Physical Geography	.71	.57
39B	Knowledge of Socio-Economic Geography	.64	.42

TABLE 2

AFFECTIVE EDUCATION FACTOR:
ORIGINAL AND ROTATED FACTOR LOADINGS

	Goal	Factor Loadings	
		Original	Rotated[a]
1A	Shyness-Boldness	.39	.74
1B	Neuroticism-Adjustment	.48	.78
1C	General Activity-Lethargy	.48	.83
2A	Dependence-Independence	.74	.71
2B	Hostility-Friendliness	.41	.80
2C	Socialization-Rebelliousness	.44	.71
3A	School Orientation	.44	.57
3B	Self-Esteem	.58	.51
4A	Need Achievement	.34	.44
25A	Group Activity-Sportsmanship	.19	.53
26A	Understanding Rules and Strategies of Sports & Games	.16	.42
41B	Citizenship	.46	.46

[a]Loadings were reflected 180 degrees

The third factor, shown in Table 3, represented Foreign Language. The goal of foreign language skills (i.e., chiefly technical skills) and two goals related to the assimilation of a foreign language all loaded high on the dimension. Moderate loadings were obtained for goals in the areas of geometry, music, and religion and for Self-Esteem (which had an opposite polarity).

Insert Table 3 about here

There is a possibility that this factor may be related to some dimension of difficulty/inappropriateness/irrelevancy (especially since Self-Esteem is inversely related to it). The descriptive paragraphs accompanying the foreign language goals demand a rather high level of achievement from an elementary pupil in an essentially monolingual society. This same aura of rigor surrounds other goals of the factor:

18A. Geometric Facility

Draws, constructs and measures line segments, perpendiculars, angles, plane and solid figures. Finds areas, volumes, circumferences, and perimeters. Draws to scale.

22A. Aural Identification of Music

Identifies the mood, rhythm, and the harmonic and melodic characteristics of musical selections by listening. Identifies voice types, instruments, types of music (folk, classical, etc.), major compositions and composers, and national or ethnic origins (e.g., spirituals) by listening.

22B. Music Knowledge

Understands major historical and national developments. Understands common terminology (e.g., chords, scale, key).

Table 4 shows the factor termed Reasoning and Scientific Thinking. Most goals represent the major dimensions of Reasoning, Creativity, Scientific Processes, and Scientific Knowledge. It is interesting to note that the skills involve abstraction and higher-level abilities, although equally "cognitive" but less

TABLE 3

FOREIGN LANGUAGE FACTOR:
ORIGINAL AND ROTATED FACTOR LOADINGS

	Goal	Factor Loadings	
		Original	Rotated[a]
3B	Self-Esteem	.04	-.45
11A	Reading Comprehension of a Foreign Language	-.44	.88
11B	Oral Comprehension of a Foreign Language	-.45	.84
11C	Speaking Fluency of a Foreign Language	-.41	.84
11D	Writing Fluency in a Foreign Language	-.50	.87
12A	Cultural Insight through a Foreign Language	-.43	.73
12B	Interest in and Application of a Foreign Language	-.34	.72
18A	Geometric Facility	-.01	.44
22A	Aural Identification of Music	-.47	.44
22B	Music Knowledge	-.46	.43
33	Religious Knowledge	-.29	.47

[a]Loadings were reflected 180 degrees

abstract goals do not appear. For example, all three Reasoning goals and both Creativity goals in the 106 goal set loaded high, but three related to memory (Span and Serial Memory, etc.) did not. The two goals in clearly non-science areas stress reasoning by the student. Partial descriptions follow:

38B. Knowledge of Governments

Understands the United States government; its origin, development, structure and functions . . . Understands political systems and philosophies.

40B. Social Organization

Understands how people and nations are interrelated and interdependent.. .

Insert Table 4 about here

Table 5 lists the highest loadings for the factor called Arts Education. Almost all goals fell into the areas of Arts, Crafts, Music, or Dance. Two non-art goals also appeared, (27B) Listening Reaction and Response and (37A) Science Interest and Appreciation. It is difficult to interpret their relationship to the arts--except possibly in some indirect way. Both share with the art goals a non-cognitive, motivational-affective connotation.

Insert Table 5 about here

The factor Physical Performance, which accounted for a small amount of variance, is shown in Table 6. Most goals related to some display of physical or muscular ability. The somewhat high loading for (10A) Span and Serial Memory is not readily interpretable.

Insert Table 6 about here

TABLE 4

REASONING AND SCIENTIFIC THINKING FACTOR:
ORIGINAL AND ROTATED FACTOR LOADINGS

	Goal	Factor Loadings	
		Original	Rotated[a]
8A	Classificatory Reasoning	.28	.58
8B	Relational-Implicational Reasoning	.20	.55
8C	Systematic Reasoning	.29	.70
9A	Creative Flexibility	.10	.43
9B	Creative Fluency	.21	.50
13F	Written Expression	.24	.44
15C	Comprehension of Equations and Inequalities	.16	.43
15D	Comprehension of Number Principles	.04	.44
17B	Independent Application of Math Skills	.29	.53
19B	Statistics	.09	.40
30A	Recognition of Word Meanings	.05	.40
30B	Understanding Ideational Complexes	.05	.46
31A	Inference-making from Reading Selections	.06	.52
31B	Recognition of Literary Devices	-.02	.40
31C	Critical Reading	.35	.76
32B	Attitude and Behavior Modification from Reading	-.02	.41
35A	Observation and Description in Science	.40	.59
35B	Use of Numbers and Measures in Science	.33	.57
35C	Classification and Generalization in Science	.39	.65
35D	Hypothesis Formation in Science	.53	.77
35E	Operational Definition in Science	.30	.55
35F	Experimentation in Science	.43	.68
35G	Formulation of Generalized Conclusion in Science	.54	.71
36A	Knowledge of Scientific Facts and Terminology	.30	.50
36B	The Nature and Purpose of Science	.35	.63
37B	Application of Scientific Methods to Everyday Life	.27	.61
38B	Knowledge of Governments	.05	.41
40B	Social Organization	.19	.44

[a]Loadings were reflected 180 degrees

TABLE 5

ARTS EDUCATION FACTOR:
ORIGINAL AND ROTATED FACTOR LOADINGS

	Goal	Factor Loadings	
		Original	Rotated
5A	Appreciation of Arts and Crafts	.51	.68
5B	Involvement in Arts and Crafts	.68	.84
6A	Representational Skill in Arts and Crafts	.26	.52
6B	Expressive Skill in Arts and Crafts	.48	.57
7A	Arts and Crafts Comprehension	.31	.51
7B	Developmental Understanding of Arts and Crafts	.23	.46
20A	Music Appreciation	.48	.69
20B	Music Interest and Enjoyment	.49	.70
21B	Music Instrument Playing	.27	.42
21C	Dance (Rhythmic Response)	.41	.60
22A	Aural Identification of Music	.26	.54
22B	Music Knowledge	.14	.47
27A	Listening Reaction and Response	.38	.44
37A	Science Interest and Appreciation	.40	.40
40A	Cultural Knowledge	.20	.42

TABLE 6

PHYSICAL PERFORMANCE FACTOR:
ORIGINAL AND ROTATED FACTOR LOADINGS

	Goal	Factor Loadings	
		Original	Rotated
10A	Span and Serial Memory	-.14	.42
21A	Singing	-.08	.41
24A	Muscle Control (Physical Education)	-.15	.46
24B	Physical Development and Well-Being	-.38	.53
25B	Interest in and Participation in Sports and Games	-.38	.63

The seventh factor, again accounting for little variance, was termed the Non-Traditional Education factor. As can be seen in Table 7, the goals share the quality of being out of the mainstream of typical curricular concerns of the elementary school.

Insert Table 7 about here

CONCLUSIONS

This study contributes to the validity of the needs assessment approach taken in the CSE KIT. One hundred and six goals rated for their importance resulted in correlations yielding factors very much in line with commonly held classification schemes of school curricula. The factors made sense in terms of typical conceptions of elementary school activities.

There are certainly limitations to this study. The author takes refuge with the caveat that it was an exploratory study, a first attempt with a small sample to search for commonalities in the rating of educational goals. This was not, however, a "blind" factor analysis (Mulaik, 1972) since the CSE goals are grouped into major categories very similar to the obtained factors and since there are ample precedents in the literature (Bloom, 1956; Krathwohl, 1964) of structural conceptualizations of education that can be related to the factors reported here.

Two obvious difficulties with the data in this study concern the mixture of populations and the psychometric property of the ratings. Ratings for principals, teachers, and parents were analyzed together although the groups are not entirely homogeneous. In addition, the rating procedure required at least five goals to appear at each interval of the scale; therefore, scores were semi-ipsative rather than completely independent.

TABLE 7

NON-TRADITIONAL EDUCATION FACTOR:
ORIGINAL AND ROTATED FACTOR LOADINGS

	Goal	Factor Loadings	
		Original	Rotated
23A	Practicing Health and Safety Principles	.27	.49
23B	Understanding Health and Safety Principles	.46	.55
33	Religious Knowledge	.43	.49
34	Religious Belief	.37	.45
38B	Knowledge of Governments	.50	.52
40B	Social Organization	.32	.49

Future research could well be directed at performing separate analyses for each population group (principals, parents, teachers). Another approach might be to employ Q-factor Analysis or some cluster analysis technique (Overall & Klett, 1972) to discover if individuals from separate populations are independent of one another in their rating behavior.

The factors obtained in this study coupled with evidence from past research suggest future inquiry into the meanings and uses of the CSE goals. One example of such research focuses on the Foreign Language goals. Respondents in the national field test of the KIT rated these goals uniformly low (Hoepfner, Bradley, & Doherty, 1973). Further, the present study shows that they cohere in one factor that seems opposed to judgments of the importance of Self-Esteem.

More research is needed on how these facts fit in with the problem of bilingual education and minority education. Some provision may be necessary to have separate goals for bilingualism (e.g., Knowledge of Spanish) or to adapt the present goals for special populations. It is unclear exactly how these goals are now perceived--foreign language = non-English, foreign language = non-English/non-Spanish, or some other psychological equation.

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